

California Environmental Protection Agency

Air Resources Board

Monitoring and Laboratory Division

Mission, Vision, and Accomplishments

California Environmental Protection Agency

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Mission, Vision, and Accomplishments

December 2001

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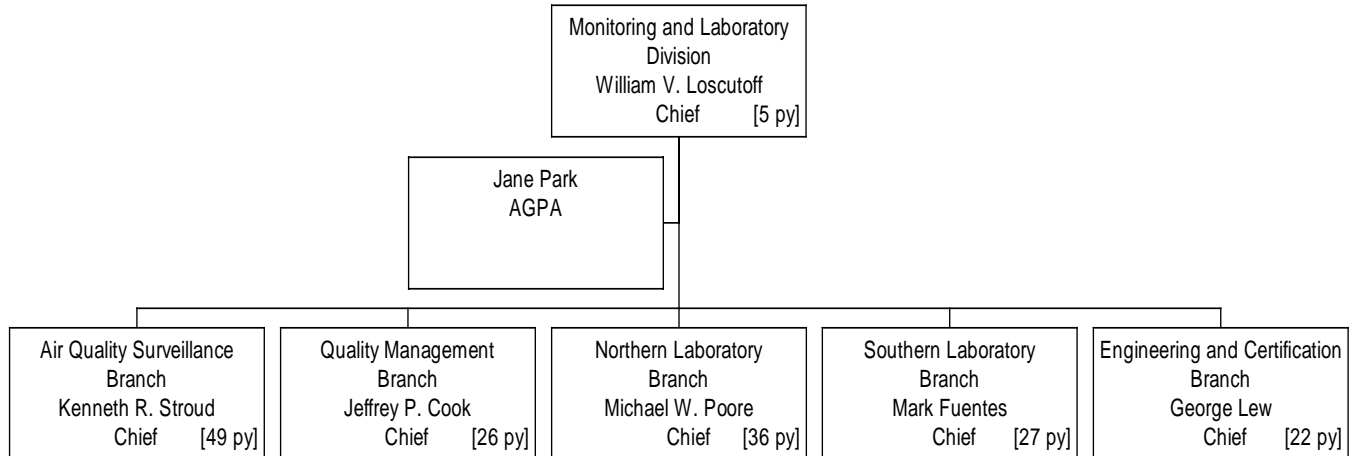
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Monitoring and Laboratory Division

Mission Statement

To provide accurate, relevant, and timely measurements of air pollutants and their precursors to support California's Air Quality Management Program for the protection of public health.

1. MLD Organizational Chart



2. Values

- Commitment to provide accurate, relevant, and timely information to our clients
- Integrity that promotes trust and open communication
- Competence that results in effective, high-quality products
- Pride in work that results from accountability and ownership

3. Vision

- Anticipate emerging needs
- Improve program and operational efficiency
- Promote expertise of staff
- Outreach for division products and activities
- Promote clear direction through effective communication
- Encourage public/private and public/public partnerships

4. Selected Accomplishments Over the Last Five Years

Particulate Matter

- PM 2.5 Laboratory
 - Implemented a system for measuring fine particulate mass.
 - Developed techniques for measuring major constituents of particulate matter.
- PM 2.5 Monitoring
 - Implemented and deployed statewide network for fine particulate monitoring.
 - Deployed 7 PM 2.5 speciation monitors.
 - Deployed 20 continuous PM 2.5 monitors in cooperation with local air districts.
 - Deployed 80 Federal Reference Method samplers for PM 2.5 in cooperation with local air districts.
 - Implemented high-concentration monitoring for mobile and stationary sources.
 - Installed national chemical speciation trend sites.
 - Assessed California-specific data and monitoring needs.
 - Developed standard operating procedures and Quality Assurance Program Plan for field samplers.
- PM 10 Monitoring
 - Performed mass analyses of SSI PM 10 filters, collected at 56 sites in California and 12 sites in Mexico (approximately 4300 filters per year).
 - Operated and performed mass analyses for 18 dichotomous PM 10 samplers (0-2.5 μm , and 2.5-10 μm) at sites throughout California (approximately 2600 filters per year).
 - Performed PM 10 ion analyses (five ions) for samples from 31 sites (2800 filters per year), and total carbon analyses for 25 sites (approximately 1600 filters per year).
 - Performed elemental analyses (30 elements) for chemical characterization of dichotomous sampler filters.
- Visibility Monitoring Program
 - Developed network design and site selection for the expanded IMPROVE Network.

Photochemical Assessment Monitoring Stations (PAMS) and Non-methane Organic Compounds (NMOC)

- Photochemical Assessment Monitoring Stations (PAMS) support
 - Provided laboratory and analytical support to Air Pollution Control Districts in the San Joaquin and Sacramento Valley Air Basins.
 - Revised the California Alternative Plan for monitoring ozone precursors to focus on essential elements.
 - Developed and instituted substantial cost saving air quality monitoring program for California.
- PAMS data analysis
 - Conducted statewide analyses of volatile organic compounds (VOC) data with U.S. EPA and PAMS Air Pollution Control Districts.
- Evaluated continuous hydrocarbon analyzer (TECO 55) data used in the PAMS program, which led to the increase of its sensitivity by 50 percent.
- Organized and participated in PAMS Technical Advisory Committee (PAMTAC) meetings which include staff from California PAMS districts, the U.S. EPA - Region IX, U.S. EPA – OAQPS.
- Ambient air comparisons
 - Developed and implemented an ambient air comparison program to check laboratory responses in support of PAMS.
- Evaluated the sampling frequency and hydrocarbons in the PAMS network.
- PAMS and NMOC Audits
 - Conducted annual laboratory audits, whole air sampler performance checks, through-the-probe continuous analyzer performance audits, and through-the-probe sampler performance audits to assess the accuracy of methods used to measure ambient concentrations of hydrocarbons and total non-methane organic compounds (TNMOC). Audits are performed to ensure the validity of the collected data.
 - Developed and implemented a through-the-probe carbonyl audit program in support of PAMS.

Motor Vehicle Emissions

- Vehicles Emission Testing
 - Developed, adopted, and implemented speciated exhaust test methods used to support the Low Emission Vehicle (LEV), in use compliance, Title 13 compliance testing, and the vehicle surveillance programs.
 - Provided guidance for development of data quality management system.
- American Industry/Government Emission Research (AIGER) Cooperative Research and Development Agreement
 - Participated in industry/government cooperative projects to develop efficient low-level measurement techniques and analytical standards.
- Marine Engine Study
 - Provided technical support and NMHC exhaust analysis to Mobile Source Control Division (MSCD) of the CARB, in support of their marine outboard and personal water craft control regulation.

Motor Vehicle Fuels

- Cleaner Burning Gasoline
 - Developed, adopted, and implemented gasoline analytical test methods for Phase III gasoline and low sulfur diesel.
 - Worked with oil refiners to develop a formal process for demonstrating the effectiveness of site-specific alternative test methods for gasoline to accommodate the ability of refiners to obtain equivalency for on-line methods.
 - Developed, evaluated, adopted, and implemented physical and chemical test methods for all eight regulated parameters of California Phase II Reformulated Gasoline.
 - Worked with oil refiners to develop a formal process for demonstrating the effectiveness of alternative test methods, which cannot be evaluated by traditional round robin studies.
 - Developed, adopted, and implemented a test method for measuring sulfur in denatured ethanol in support of the Phase III Reformulated Gasoline regulations.
 - Developed and evaluated test methods for measuring benzene, total aromatics, and olefins in denatured ethanol (in progress).

- Clean Diesel
 - Developed, adapted, and implemented diesel fuel test methods.
 - Evaluated, adopted, and implemented chemical test methods for measuring sulfur, aromatics, and polycyclic aromatic hydrocarbons in California Clean Diesel.
 - Developed and implemented test methods for detecting adulteration of California Clean Diesel and identifying its refinery of origin.

Toxic Air Contaminant (Toxics, TAC) Program

- Performed analyses for hexavalent chromium by Ion Chromatography (IC) and elemental analyses by X-Ray Fluorescence for chemical characterization of low volume TSP filters collected at 24 sites in California and Mexico (approximately 800 filters per year).
- Performed analyses for VOCs collected at 20 sites in California and 2 in Mexico (approximately 700 samples per year).
- Performed carbonyl analyses collected at 20 sites in California and 2 in Mexico (approximately 700 samples per year).
- Performed polyaromatic hydrocarbon (PAH) analyses collected at 20 sites in California and 2 in Mexico (approximately 700 samples per year).
- Conducted ambient monitoring for methyl bromide and 1,3-dichloropropene (Telone) fumigants in Kern, Monterey, and Santa Cruz counties.
- Mexico monitoring
 - Established 12 ambient air monitoring sites.
 - Supported development of emissions inventories.
 - Monitored toxics in Mexicali and Rosarito.
- Conducted ambient air monitoring for Methyl tert-butyl ether (MTBE) at 20 sites in California and 2 in Mexico.
- Conducted ambient and application site monitoring for 19 different pesticides in support of the Department of Pesticide Regulation TACs program (approximately 2100 samples per year).

- Ambient air comparisons
 - Developed and implemented an ambient air comparison program to check laboratory responses in support of toxics program.
- Benzene trends paper
 - Confirmed improvements in air quality levels of benzene resulting from regulatory programs to control benzene emissions.
- Performed source testing for TACs “Hot Spot” and MACT development.
- Evaluated the monitoring sites in the TACs network to verify if sites are placed appropriately with respect to specific examination criteria.

Wet Acid Deposition

- Performed pH, conductivity, and ion analyses for wet acid deposition samples from 10 sites in California (approximately 250 analyses per year).

Consumer Products

- Established consumer products laboratory and tested approximately 800 consumer products annually.

Quality Improvement

- Summarized each Air District's precision and accuracy data.
- Developed a program that verifies the accuracy of wind speed, wind direction, and outside temperature data.
- Division Data Quality Report
 - Summarized the Division's air monitoring quality assurance/quality control information and prepared an annual compendium containing all QA results.
- Created a Web Site that presents background information on various audit programs and air monitoring activities, the Quality Assurance Manual, and other air monitoring site information.
- ARB Quality Assurance Manual
 - Developed Web pages to make ARB's Quality Assurance Manual available electronically.
- Employed Global Position System to obtain coordinates of ambient air monitoring sites.

- PAMS and NMOC
 - Conducted annual through-the-probe performance audits, laboratory performance audits, and whole air comparison checks for the PAMS program to assure the validity of the collected data.
 - Studied non-methane organic compound profiles in winter field study to characterize and track ozone precursors over time for ozone assessment and regulatory activities.
- Toxics
 - Studied carbonyl sampling collection media to determine a more efficient and effective sampling media (silica gel).
 - Conducted annual through-the-probe performance audits, laboratory performance audits, and whole air comparison checks for the toxics program at sites in the Statewide network to assure the validity of the collected toxics data.
- Criteria Pollutants
 - Conducted annual through-the-probe performance audits for the criteria pollutants to assure validity of collected criteria pollutant data.
- Particulate Matter
 - PM 2.5 Audits
 - Developed and implemented a pre-certification program for PM 2.5 laboratories scheduled to produce data for record.
 - Developed and implemented a program of system audits for PM2.5 laboratories.
 - Developed and implemented a comprehensive field and laboratory Quality Assurance audit program.
 - PM10 Audits
 - Certified State PM10 laboratories.
 - Conducted annual flow audits on all PM10 samplers in the State.
- Developed and implemented detailed field, laboratory, and QA programs for the PM2.5 Quality Assurance (QA) program.
- Conducted annual flow audits on all PM10 samplers in the State.
- Certified State PM10 laboratories.

- Evaluated the performance of PM10 samplers near Owens Lake.
- Evaluated loss of volatile nitrate particulate compounds during shipping.

Special Activities

- Area-specific monitoring
 - Expanded air pollution monitoring to the Lake Tahoe area.
- Emergency Monitoring and Laboratory Response Support
 - Provided air monitoring in response to the Tracy and Westley tire fires, and the Lake Davis pike eradication project.
- Large-scale field studies
 - Supported the Central California Ozone Study (2000).
 - Supported the Southern California Ozone Study (1997).
 - Supported the California Regional Particulate Air Quality Study by providing field, laboratory, audit, and equipment services.
- Provided consultation activities
 - Pacific Rim
 - Mexico
 - Vietnam
 - Global Environmental Management System
- Carbonyl Ambient Air Comparison
 - Developed a new system that is capable of collecting ambient air into multiple sampling cartridges.

Technology

- Instrument evaluation
 - Deployed direct-measuring non-methane organic compound analyzer (TECO 55) for ambient and vehicle exhaust emission measurements.
 - Evaluated real-time light scatter measurement technique (Grimm sampler) used in measuring fine particulate matter as part of a U.S. EPA equivalency study for the manufacturer.
 - Evaluated instruments designed to measure trace levels of sulfur.
 - Evaluated and participated in the development of direct reactivity measurement technique for Low Emission Vehicle Exhaust.

- Converted toxic air contaminant VOC analyses from Gas Chromatograph coupled with a flame ion detector (FID) and photoionization detector (PID) to an advanced technique using Gas Chromatograph/ Mass Spectrometer (GC/MS).
- Conducted PM2.5 method inter-comparison field study in Bakersfield and Fresno to evaluate filter based and continuous technologies and identify a continuous sampler suitable for the network (a BAM PM2.5 was selected and is now in place).
- Improved program efficiencies
 - Expanded number of laboratory analyses from 2,900 in 1985 to over 600,000 in 2001.
 - Revised and updated numerous source, fuels, and exhaust test methods.
- Vapor recovery
 - Revised and updated gasoline vapor recovery certification and test procedures.
 - Evaluated onboard refueling vapor recovery (ORVR) systems at service stations and in vehicles to determine compatibility between the two ORVR systems.
- Air quality data acquisition system
 - Developed new data acquisition system for acquiring, receiving, and using real-time air quality data.

5. Present and Future Projects

Particulate Matter

- U.S. EPA-sponsored Supersite for ambient air monitoring
 - In-kind support of high-technology research platform for PM studies.
- Maintain continuous particulate monitoring network
 - Deploy real-time PM10 and PM2.5 samplers.
 - Perform field study to evaluate continuous PM10 monitors.
 - Develop field Ion Chromatograph method for real-time continuous speciation.
- Support the ARB revision of the State Ambient Air Quality PM Standard and evaluate continuous PM samplers (Bakersfield study) in efforts of verifying that a suitable continuous monitor may be used for attainment designation purposes.

Ozone and NMOC

- Monitoring for NMOC at selected sites in California in support of Research Division's Weekend/ Weekday effect study on vehicle emissions.

Motor Vehicle Emissions

- Low Emission Vehicles (LEV)
 - Speciate hydrocarbon gases from vehicle exhaust samples (250-500 tests per year).
- In-use compliance testing to determine manufacturers' compliance with emission standards over the lifetime of the vehicle.
- Title 13 compliance testing evaluates manufacturers' self-certification of compliance with emissions standards for new vehicles.
- Vehicle surveillance program
 - Expand testing of exhaust samples from in-use vehicles to develop better ozone reactivity factors and mobile emission inventories (500-700 tests per year).
- Off-road equipment testing
 - Develop testing techniques for categories of small internal combustion engines (marine engines).

Motor Vehicle Fuels

- Cleaner Burning Gasoline (CBG) Program
 - Implement Supercritical Fluid Chromatography (SFC) method for olefin determinations.
 - Provide laboratory support for on-site fuel analysis.
 - Develop and implement new regulatory fuel test methods for Phase III Gasoline.
 - Develop techniques for determining specifications of denatured ethanol.
 - Develop techniques for measuring trace levels of MTBE and other oxygenates in Phase III gasoline.
- Clean diesel program
 - Develop technique for identifying unique signatures/fingerprints in diesel fuel emissions.
 - Provide laboratory support for determining red dye markers in on-road fuel.
 - Develop and implement new regulatory methods for low-sulfur diesel.
 - Provide laboratory support for low-sulfur diesel specifications.
 - Develop, evaluate, and adopt analytical methods for measuring regulated fuel components of California Clean Diesel. Perform routine testing of diesel fuel to determine compliance with regulations.
- Diesel exhaust particles
 - Develop methods for characterizing particulate matter emitted from diesel engines.
 - Develop sampling and analytical methods to confirm diesel particulates from other stationary and mobile sources.

Toxics

- Community Health Monitoring
 - Establish neighborhood monitoring sites in Los Angeles/Boyle Heights, Crockett, Oakland, Wilmington, and San Diego/Barrio Logan.
 - Monitor hexavalent chromium in Hinkley.
 - Support San Diego APCD in investigating air quality in selected potentially impacted neighborhoods.
 - Monitor for hexavalent chromium in Barrio Logan (Barrio Logan II study) to determine community impacts and to support Stationary Source Division's (SSD) revision of the Air Toxic Control Measure (ATCM) specific for hexavalent chromium.

- Collaborate with Research Division to support the Fresno Asthmatic Children's Epidemiology Study (FACES) study by providing monitoring equipment (trailer) and performing quality assurance audits.
- Asbestos monitoring
 - Perform asbestos monitoring in Gilroy in support of a draft ATCM for dust mitigation.
 - Perform asbestos monitoring in King City in support of district investigative work.
- Pesticide monitoring
 - Maintain pesticide monitoring program near fields and in nearby towns during pesticide applications.
 - Initiate monitoring for new compounds such as methyl bromide and 1,3- dichloropropene.
 - Conduct separate ambient and application site monitoring projects for up to 6 pesticides per year.
 - Develop sampling and analytical methods for pesticide air monitoring.
 - Collect and conduct analyses for up to 2,100 samples per year.
- Dioxin, furan, PCB, and PBDE monitoring
 - Revise ambient air method for dioxin sampling at ultra low detection limits.
 - In support of the proposed California Ambient Dioxin Air Monitoring Program (CADAMP) dioxins and dioxin-like furans, polychlorinated biphenyl (PCB), and polybrominated diphenyl ether (PBDE) monitoring will be conducted at 9 locations in the San Francisco Bay Area and the South Coast air basins.
- Peroxyacetyl nitrates (PAN) monitoring
 - Support the Research Division by performing PAN monitoring in Azusa and Burbank.
- Crystalline silica
 - Develop technique for measuring silica in ambient particulate samples.
- Hexavalent chromium ambient monitoring
 - Evaluate method modifications to lower detection limit.

Consumer Products

- Measure low vapor pressure products
 - Develop new laboratory techniques that identify exempt and low volatility constituents.
- Speciation of volatile organic compounds (VOCs) in consumer products
 - Develop method to identify individual compounds known to contribute to ozone formation.

Quality Improvement

- National Institute of Standards and Technology (NIST) standards inventory
 - Compile list of NIST standards used by the Northern Laboratory Branch and the Quality Assurance Section of the Quality Management Branch.
- Continually update and upgrade the Performance Audit Program
 - Update audit program, instrumentation, and audit methodologies.
 - Investigate feasibility of using alternative power source when conducting audits.
- System audits
 - Conduct program system audits of the air districts.

Special Activities

- National Environmental Laboratory Accreditation Program (NELAP)
 - Consider adoption of national laboratory certification for ambient air monitoring.
- Portable fuel container regulations
 - Develop regulations to limit gasoline spillage from portable fuel containers.
- Ethanol environmental fate
 - Perform method development on gasoline headspace analysis.
 - Provide analytical and technical support.
 - Conduct validation testing for new modeling software.
- Decentralization of power generation
 - Evaluate the need for additional oxides of nitrogen monitoring given the current trend toward decentralized power generation.

- Develop new source test methods for very low emission power generators.
- Area-specific monitoring
 - Enhance monitoring of agricultural burning emissions in the Central Valley.
 - Perform monitoring for biogenic emissions.
- Development of Fourier Transform Infrared (FTIR) testing method for ammonia and nitrous acid in vehicle exhaust.
- Analytical and source test consulting services
 - Provide analytical support for internal CARB investigations and regulatory and development projects to provide expertise in conducting emissions measurements in the parts per billion and parts per trillion range.
 - Participate in Stationary Source Division's low-emission workgroup.
 - Participate in PM 2.5 Testing Committee.
 - Perform analysis of ambient background HCs for heavy duty gas vehicle testing.
- ARCO ECD Toxics Study
 - Develop Statement of Work contracts for clients in the ARB for chemical analyses of diesel exhaust.
- Analysis of VOC's at motor vehicle testing locations in order to evaluate ambient background levels.
- SIP Measure-17
 - Evaluate feasibility of M-17 Heavy Duty Diesel (HDD) inspection/maintenance concept.
 - Provide technical support to Mobile Source Operations Division (MSOD) to establish a HDD inspection facility in Stockton.
- CNG vs. Diesel Test Program
 - Provide on-site analytical and logistical support.
 - Perform ambient background HC analysis.
- Support ARB/SCAQMD PAN monitoring efforts by servicing and repairing the analyzers.

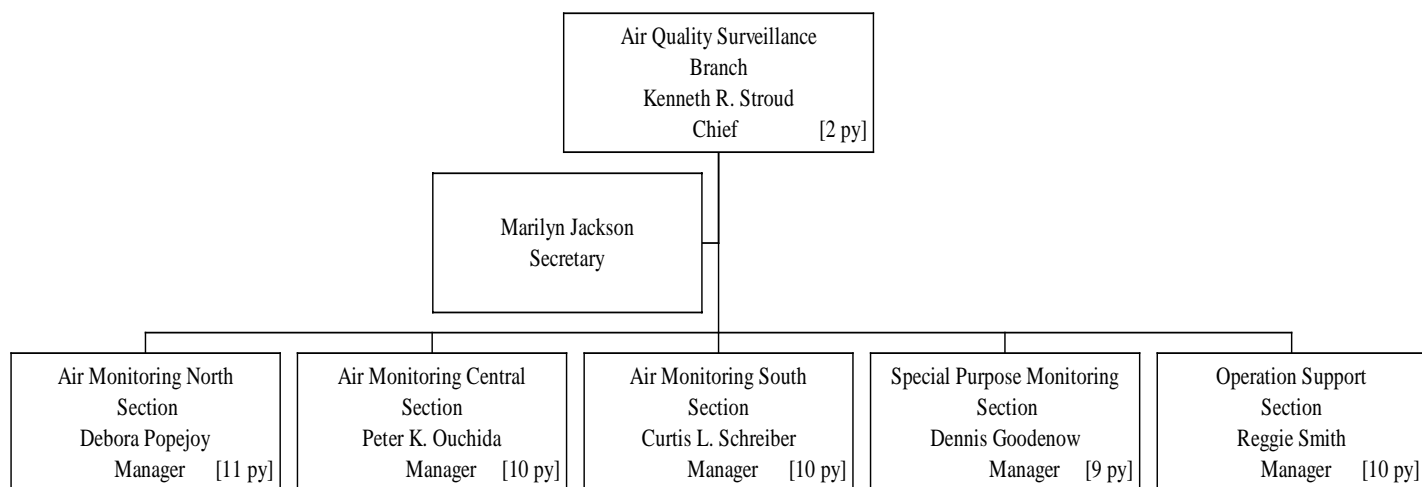
Technology

- Enhanced vapor recovery
 - Improve in-use efficiency of service station vapor recovery systems through in-station diagnostics, ensuring on-board refueling and vapor recovery system compatibility, and improve compliance determination tools.
- Source testing
 - Update source test methods to reflect latest technologies.
- Direct Non-Methane Hydrocarbon exhaust measurement
 - Work with AIGER to develop direct measurement technique.
- Upper air wind profiler network
 - Expand network of ground-based systems to measure upper air meteorological parameters from 2 to 3 sites.
- Evaluate analytical method equivalency requests from automotive industry
 - GM – alcohols, using a GM developed instrument called an “Innova”
 - Honda - carbonyls
 - BMW - NMHC
 - Refinery site-specific test methods
- Micro-scale monitoring
 - Establish air monitoring at Caldecott tunnel to closely evaluate changes in emissions from motor vehicles.
- Ambient monitoring for new compounds
 - Deploy PAN instruments at Burbank and Azusa in support of a special study conducted by Research division.
- Quality/sample track software
 - Implement automated sample login, QC reporting software and Emissions Test Track software at Southern Laboratory Branch.
- Emission Test System
 - Create database in Southern Laboratory Branch to contain all motor vehicle test results including speciated hydrocarbon analyses.

Mission Statement

To support the Air Resources Board's air pollution control program by providing accurate ambient air quality measurements to help define the nature, extent, and trend of air pollution in California.

1. Air Quality Surveillance Branch (AQSB) Organizational Chart



Branch total = 52 py

2. Base Program

The AQSB consists of five sections: the Air Quality Monitoring (AQM)-North Section, the AQM-Central Section, the AQM-South Section (based in El Monte), the Special Purpose Monitoring Section, and the Operation Support Section.

Currently, the AQSB operates a total of 51 air monitoring sites, including 4 Children's Environmental Health sites. The AQSB base program also includes nearly year-round pesticide monitoring, asbestos studies, upper-air meteorological monitoring, short-term special purpose monitoring (and the associated data management), and quality control activities with each of these tasks.



Fine particulate monitor

The AQSB provides calibration services, acceptance testing, and repair services to air districts under contract or on a fee-for-service basis. The AQSB (all sections) provides technical assistance to the air monitoring community at large.

The AQSB staff operates an Air Quality Data Acquisition System and reports more than 275,000 hourly air quality and meteorological measurements each month to the U.S. EPA's Aerometric Information Retrieval System (AIRS). Additionally, the AQSB provides real-time data to the Planning and Technical Support Division's Meteorology Section in support of the Board's AgBurn Control Program.

The AQSB staff also provides shipping and receiving services and maintains the spare parts and compressed gas cylinder inventories for the Sacramento laboratories.

Each of the three air monitoring sections provide the following air quality monitoring capabilities:

- Criteria pollutants: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, hydrogen sulfide, and particulate matter monitoring using reference and equivalent methods.
- Non-criteria pollutants: non-methane hydrocarbons, wet deposition, elemental carbon, sulfates, nitrates, and black carbon.
 - Meteorology: wind speed, wind direction, temperature, relative humidity, solar radiation, and barometric pressure.
 - Sample collection for laboratory determination of: oxygenates, aromatics, butadiene, halogenates, total metals, nitrate, sulfate, carbon, aldehydes, hexavalent chromium, dioxin, furans, PCB, PCDE, PAH's, speciated hydrocarbons, various pesticides, asbestos, and PM mass.



Meteorological tower



Particulate samplers

A. Air Monitoring - North Section

- Operate 26 air monitoring sites between Sacramento and the Oregon border.
- Collect and process air quality data for the statewide ambient air monitoring network.
- Provide technical assistance and calibration services to 7 local air districts.
- Conduct sampling in support of the ARB's AgBurn Control Program.
- Conduct asbestos monitoring.



Mack Martinez repairs an instrument

B. Air Monitoring - Central Section

- Operate 14 air monitoring sites between Modesto and Bakersfield.
- Conduct sampling of ozone precursors in support of Photochemical Assessment Monitoring Station (PAMS).
- Provide technical assistance and calibration services to 3 local air districts.
- Operate the U.S. EPA Supersite platform in cooperation with U.S. EPA and DRI (the U.S. EPA's contractor).

C. Air Monitoring - South Section

- Operate 7 air monitoring sites in southern California, including the coastal region from Paso Robles and south to Calexico and Imperial counties.
- Conduct sampling for ozone precursors at a centrally located downtown Los Angeles PAMS site.
- Oversee data collection and submittal for the Mexico border region.
- Provide technical assistance and calibration services to three local air districts.
- Conduct sampling for PAN at 2 Los Angeles PAMS sites.
- Support and conduct Children's Environmental Health Protection monitoring in southern California.

D. Special Purpose Monitoring and Data Support Section

- Conduct monitoring for the Children's Environmental Health Monitoring program.
- Conduct other special purpose air monitoring studies in support of other divisions, local air districts, or sister agencies.
- Conduct pesticide monitoring in support of the Department of Pesticide Regulations.
- Operate 3 radar wind profilers to assess upper level wind speed and direction, and ambient temperature.



Air monitoring station

E. Operation Support Section

- Work with manufacturers in the development of sampling instrumentation and methods.
- Provide technical assistance to MLD staff and local air districts with deployment of new technologies.
- Repair and service air monitoring instruments used by AQSB and local air districts.
- Evaluate prototype instruments and perform field tests for performance comparison to reference or equivalent methods.
- Provide shipping and receiving services, maintain equipment and parts inventory, and maintain gas cylinder storage for Sacramento laboratories.

3. Branch Capabilities

Sampling technology for Criteria and Non Criteria Pollutants

- Carbon monoxide, perform continuous nondispersive infrared analysis.
- Nitrogen dioxide, perform continuous chemiluminescent analysis.
- Sulfur dioxide, perform continuous fluorescence analysis.
- Hydrogen sulfide, perform continuous sampling.
- Ozone, perform ultraviolet analysis.
- Particulate matter (PM10, PM2.5), perform 24-hour integrated filter sampling using a high or low volume sampler with a size-selective inlet.



Richard Michaud performs acceptance testing

- Continuous particulate matter monitors
- Toxic sampling (perform the following sampling):
 - Collect 24-hour integrated canister sample.
 - Collect 24-hour integrated sorbent sample.
 - Collect 24-hour integrated filter sampler.
 - Collect 28-day PUF sample.
- Non-methane organic compounds, operate continuous samplers, and perform flame ionization analysis.
- Carbon, perform semicontinuous sampling.
- Collect meteorological samples (use upper air wind profilers).
- Nitrate, perform semicontinuous sampling.

Evaluation of Emerging Instrument Technologies

- Perform facility and laboratory acceptance testing.
- Use an environment chamber for thermal studies.
- Perform field testing of instrumentation and equipment at air monitoring sites.
- Evaluate field testing of prototype instruments for performance comparison to reference and/or conventional methods (BAM, BGI, carbon analyzer, and field IC).

Special Studies

- Evaluate new and innovative air monitoring techniques and equipment.
- Operate special sampling platforms to support limited-term focused monitoring studies such as pesticide, near-source hexavalent chromium, and asbestos monitoring.
- Provide technical support for local and regional air quality studies.

Quality Improvement

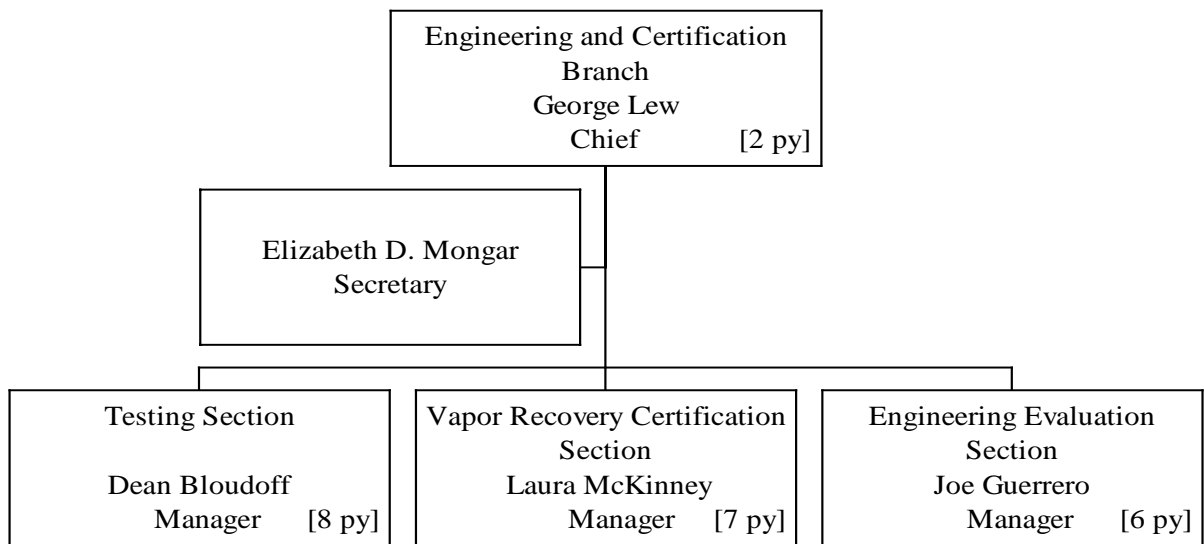
- Conduct semi-annual instrument calibrations at all network sites.
- Perform nightly automatic calibration checks.
- Perform hourly network data polling.
- Employ new technologies such as beta attenuation monitor, continuous nitrate, continuous carbon, field ion chromatograph, aethalometer, and field GC for non-methane organic compounds.

Mission Statement

To support the Air Resources Board's stationary and mobile source programs by developing laboratory and field test procedures for compliance determinations.

To develop control measures for reducing emissions, implement the vapor recovery certification program, and to provide technical assistance by conducting engineering or compliance testing.

1. Engineering and Certification Branch (ECB) Organizational Chart



Branch total = 23 py

2. Base Program

The Engineering and Certification Branch has three sections, which include the Testing Section, the Engineering Evaluation Section, and the Vapor Recovery Certification Section. The Testing Section tests stationary sources and assists the Engineering Evaluation and the Vapor Recovery Certification Sections in carrying out critical mission duties. The Engineering Evaluation Section develops and updates vapor recovery and stationary source test methods. The Vapor Recovery Certification Section performs testing and certification of vapor recovery systems components for gasoline dispensing facilities.

The activities carried out by each Section are listed below:

A. Testing Section

- Assist Engineering Evaluation and Vapor Recovery Certification Sections.
- Assist ARB staff, local air districts, and interested public with any stationary source test problems they may have.
- Perform vapor recovery system testing.
- Perform stationary source testing.
- Write or assess test protocols.
 - Test protocols are implemented in the field for practical use. Modifications are made to the test protocol based on field experience, source impact, and comments by other staff and clients before approval. Project leader and ECB management approve final modifications.
- Write or review test report.
 - Perform a peer review of any vapor recovery or stationary source test.
- Perform electrical and mechanical modifications for source testing purposes.
- Perform setup and fabrication of test equipment used by Testing, Engineering Evaluation, and Vapor Recovery Certification Sections.
- Develop and present stationary source test methods for ARB approval.



Vapor recovery nozzle testing



Source testing

B. Vapor Recovery Certification Section

- Test and certify vapor recovery systems and components used at Gasoline Dispensing Facilities (GDF).
- Perform Efficiency Testing of GDF.
- Develop vapor recovery certification test procedures.
- Establish new equipment standards for vapor recovery components (groove and cam and static torque requirements).
- Write vapor recovery test procedures used in Phase I vapor recovery certifications and compliance testing.
- Update existing vapor recovery test procedures in efforts of reducing emissions and potential exposure to Vapor Recovery Certification Section personnel.
- Perform extensive public outreach to aid air districts with implementation of the Enhanced Vapor Recovery program.



Phase I Efficiency Testing

C. Engineering Evaluation Section

- Develop portable fuel container regulations.
- Evaluate requests to use alternate methods for vapor recovery and stationary source test methods.
- Develop off-road equipment emission control measures.
- Develop stationary source test methods.
- Conduct technology reviews.
- Conduct equipment pre-certification.



Honda mower in shed

3. Branch Capabilities

Stationary Source Testing/Engineering Evaluation

- Perform carbon dioxide, carbon monoxide, total hydrocarbons, oxides of nitrogen, oxygen, and sulfur dioxide determinations by ARB Method 100.
- Perform moisture determination by ARB Method 4.
- Perform total particulate matter determination by ARB Method 5.
- Perform particle sizing/PM10 determination by ARB Method 501.
- Perform dioxins, furans, polybrominated diphenyl ether, and polychlorinated biphenyl analysis by High Resolution Gas Chromatography/Mass Spectrometry (ARB Method 429).
- Perform hexavalent chromium (Cr^{+6}) determination by colorimetry or ion chromatography and total chromium determination by AA (ARB Method 425).
- Perform formaldehyde and acetaldehyde determinations by ARB Method 430.
- Perform bulk asbestos concentration determination by ARB Method 435.
- Perform vapor recovery testing by ARB certification and test procedures.
- Perform Long Term pressure monitoring of Underground Storage Tanks (UST).

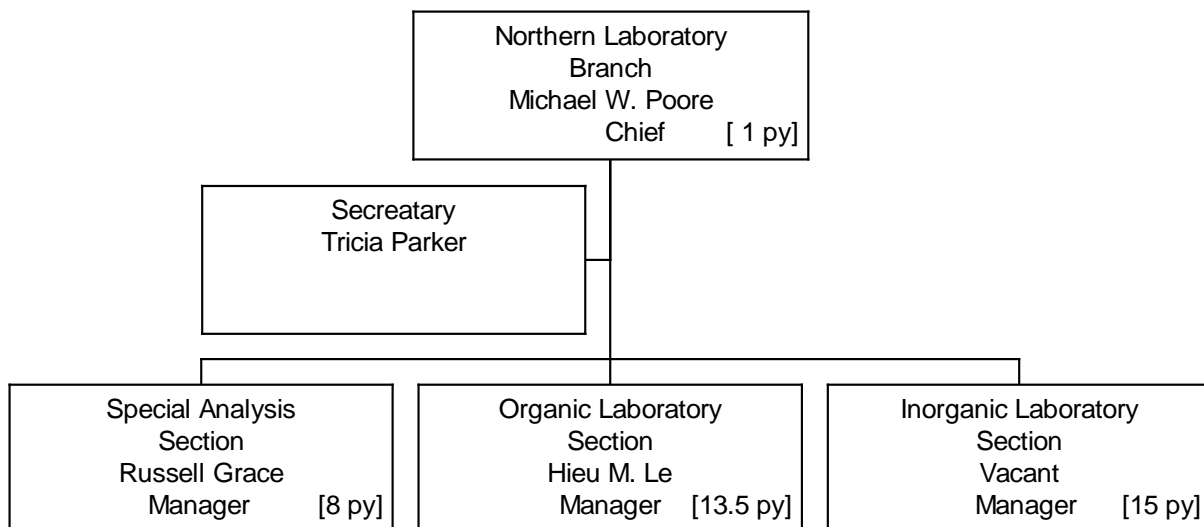
Vapor Recovery Certification

- Certify vapor recovery dispensing facilities (CP-201).
- Perform emission factor determination for Phase I systems at dispensing facilities (TP-201.1A).
- Perform determination of volumetric efficiency for Phase I vapor recovery systems (TP-201.1).
- Perform determination of Hazardous Air Pollutants and Toxic Air Contaminants (TACs) from vapor recovery processors (TP-201.2H).
- Determine gasoline liquid retention in nozzles and hoses (TP-201.2E).
- Perform emission factor determination for Phase II systems (TP-201.2).
- Determine pressure integrity of vapor recovery equipment (TP-201.2B).
- Determine pressure integrity of drop tube overfill protection devices (TP-201.20).
- Perform two-inch static pressure test (TP-201.3).
- Perform five-inch static pressure test (TP-201.3A).
- Perform static pressure of vapor recovery system on aboveground tanks (TP-201.3B).
- Conduct dynamic back pressure performance tests (TP-201.4).
- Perform air to liquid volume test (TP-201.5).
- Perform liquid removal of vapor recovery system (TP-201.6).

Mission Statement

To support the Air Resources Board's ambient air monitoring, stationary source, and consumer products programs by developing laboratory and ambient air collection test procedures. To perform near source ambient air monitoring, conduct analyses of ambient air samples and consumer products, and provide technical assistance to clients.

1. Northern Laboratory Branch (NLB) Organizational Chart



Branch total = 37.5 py

2. Base Program

There are three sections in the Northern Laboratory Branch: Special Analysis Section, Inorganics Laboratory Section, and Organics Laboratory Section. Together, these sections analyze consumer products, stationary source, and ambient air samples. The following information lists the activities performed by each section.

A. Special Analysis Section

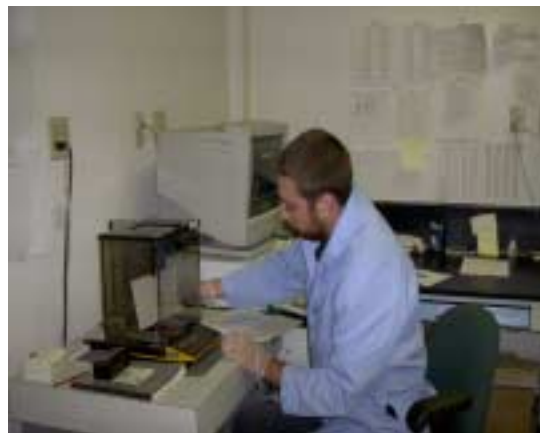
- Perform consumer product method development and compliance testing.
- Perform VOC determination of paints and coatings.
- Perform analyses of ambient and application pesticide samples.
- Perform analyses of stationary source samples.



Michael Orbanosky logs in a sample for analysis

B. Inorganics Laboratory Section

- Perform PM 2.5/PM 10 mass and ionic speciation determinations.
- Perform lead and sulfate determinations.
- Perform organic/elemental carbon determinations.
- Perform acid deposition sample analyses.
- Perform Toxics Air Contaminants (TACs) (metals and hexavalent chromium) determinations.
- Maintain electronic database, provide computer support, and update and maintain Laboratory Information System (LIMS).



Scott Randall weighs a filter

C. Organics Laboratory Section

- Perform total hydrocarbon and hydrocarbon speciation determinations (PAMS/NMOC).
- Perform TACs determinations for halogenated organics, aromatics, and carbonyl compounds.
- Perform ambient air fuel oxygenates (MTBE, ETBE, Ethanol, and TAME) determinations.
- Perform method development in support of Children's Environmental Health Protection Program and Neighborhood Assessment Program.



Judy Hodgkins performs sample analyses

3. Branch Capabilities

Stationary Source Testing/Near Source Monitoring

- Perform total particulate matter determination by ARB Method 5.
- Perform metals (19 elements) determinations by inductively coupled plasma atomic emission spectroscopy and atomic absorption spectroscopy (AA) (ARB Method 436).
- Perform hexavalent chromium (Cr^{+6}) determination by ion chromatography.
- Perform formaldehyde and acetaldehyde determinations by ARB Method 430.
- Perform pesticides and breakdown products (47 compounds) determinations by Gas Chromatography and High Performance Liquid Chromatography.

Consumer Products

- Perform VOC determination of antiperspirant/deodorant, consumer products, and aerosol coating products by ARB Method 310.
- Perform total volatile determination by gravimetric procedure (MLD SOP ES01).
- Perform ammonia determination by specific ion electrode (MLD SOP ES02).
- Perform water determination by Karl Fischer or Gas Chromatography (MLD SOP ES03 or MLD SOP ES04).
- Perform compound determinations for exempt pollutants in aerosol propellant by Gas Chromatography/Thermal Conductivity Detector (MLD SOP ES05). Compounds exempt under Title 17 California Code of Regulations include CO, CO₂, methane, ethane, and four halogenated organic compounds.
- Perform compound determinations for 31 exempt and prohibited compounds (exempt or prohibited per Title 17 California Code of Regulations Gas Chromatography/Mass Spectrometry (MLD SOP ES06)).
- Perform acetone and low molecular weight alcohol determinations in consumer products by Gas Chromatography-FID (MLD ES07).
- Perform vapor pressure determination by Isoteniscope (MLD SOP ES08).
- Perform boiling point determination by Gas Chromatography/Flame Ionization Detector (MLD SOP ES09).
- Perform boiling point determination by distillation (MLD SOP ES10).

Ambient Air**-Particulate Matter**

- Perform mass determination of PM10 filters by electronic analytical balance (MLD SOP 16).
- Perform mass determination of PM2.5/PM10 filters (dichotomous sampler) by electronic analytical balance (MLD SOP 29).
- Perform mass determination of PM2.5 (Federal Reference Method) by electronic analytical balance (MLD SOP 55).
- Perform ionic species (5) determination from PM10 and PM2.5 filters by Ion Chromatography (MLD SOP 7 and 23).
- Perform elemental/organic carbon determination from PM2.5 filters from chemical speciation network.
- Perform metals determination (30 elements) from PM2.5/PM10 filters (dichotomous sampler), PM2.5 chemical speciation Teflon filters, and TSP filters by X-Ray Fluorescence (MLD SOP 34).
- Perform nitric acid determination from PM2.5 chemical speciation filters by Automated Colorimetry (MLD SOP 35).
- Perform anions (3) determination from PM2.5 chemical speciation filters by Ion Chromatography (MLD SOP 44).
- Perform ammonium determination from PM2.5 chemical speciation filters by Automated Colorimetry (MLD SOP 46).
- Perform cations determination from PM2.5 chemical speciation filters by Ion Chromatography (MLD SOP 56).

-Toxics and PAMS

- Perform hexavalent chromium determination from TSP filters by Ion Chromatography (MLD SOP 39).
- Perform sulfate determination from TSP filters by Ion Chromatography (MLD SOP 33).
- Perform 1,3-butadiene and halogenated and aromatic compounds determinations by Gas Chromatography/Mass Spectrometry (MLD SOP 58).
- Perform oxygenates (MTBE, ETBE, and TAME) determination by Gas Chromatography/Flame Ionization Detector (MLD SOP 50).
- Perform formaldehyde, acetaldehyde, and methyl ethyl ketone determination by High Performance Liquid Chromatography/Ultraviolet Detector (MLD SOP 22).
- Perform polyaromatic hydrocarbons (PAH) determination by High Performance Liquid Chromatography/Fluorescence Detector (MLD SOP 28).
- Perform total non-methane organic compound (TNMOC) determination by Gas Chromatography/Flame Ionization Detector (MLD SOP 24).

- Perform speciated non-methane organic compounds (NMOC) (70 compounds) determination by Gas Chromatography/Flame Ionization Detector (MLD SOP 32).

-Wet Deposition

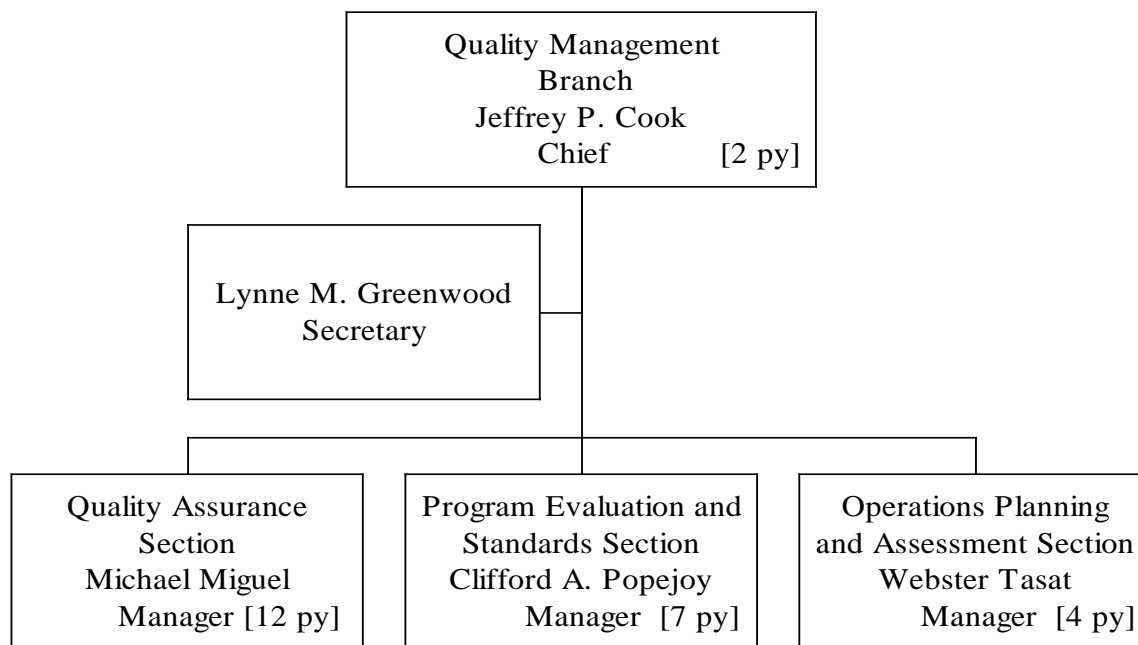
- Perform conductance and pH determination of wet deposition samples by conductivity and pH meter (MLD SOP 36).
- Perform ion species (8) determination of wet deposition samples by Ion Chromatography (MLD SOP 37).

Mission Statement

Plan, conduct, review, and report quality assurance, quality assessment, and quality control activities, and provide operational support and assessment for ambient air monitoring programs within MLD and local air districts.

Ensure ambient air quality, speciated motor vehicle exhaust, fuels, consumer products, dioxins, asbestos, pesticides, and Children's Environmental Health Protection Monitoring data meet or exceed the data quality and program objectives of the end users.

1. Quality Management Branch (QMB) Organizational Chart



Branch total = 25 py

2. Base Program

The Quality Management Branch is made up of three sections: the Program Evaluation and Standards Section, the Quality Assurance Section, and the Operations Planning and Assessment Section. Two of the sections, Program Evaluation and Standards Section and Quality Assurance Section, are set up along classic quality assurance lines. Three elements (quality assurance, quality assessment, and quality control, as described below) provide a foundation for the work of these two sections. The Operations Planning and Assessment Section staff incorporates the same three elements into the overall planning and coordination of various non-routine monitoring projects carried out by the Division. From preparing sampling and analysis protocols to participating in monitoring site selection and instrument deployment, the Operations Planning and Assessment Section staff provides guidance and serves as leads throughout all stages of a monitoring project. Monitoring projects stem from new initiatives and programs which include the Children's Environmental Health Protection Program, the Community Health Program, Asbestos Program, California Ambient Dioxin Air Monitoring Program, and the expanded pesticide monitoring programs.

Classic quality assurance elements:

- **Quality Assurance**

Ensure the quality of the Division's products meet the users' needs.

Perform site reviews and system audits, consult with new groups to develop new monitoring and analytical programs, and assess the effect of changes in measurement methods. Report quality assessment and quality control results and provide independent review of quality control activities and results.

- **Quality Assessment**

Provide instruments, analyzers, and samplers with known standards to quantitatively evaluate the performance of measurement systems.

Perform field audits of criteria and non-criteria pollutant gaseous analyzers, particulate samplers, meteorological equipment, and criteria and non-criteria pollutant laboratory analyses for ambient and source level measurements.

- **Quality Control**

Ensure aspects of daily operations utilize high level practices, procedures, and standards.

Evaluate the performance of, and perform first level troubleshooting for, instruments, and assay the composition and concentration of pollutant gas mixtures, and establish their comparability to Standard Reference Materials and instruments from the National Institute of Standards and Technology (NIST).

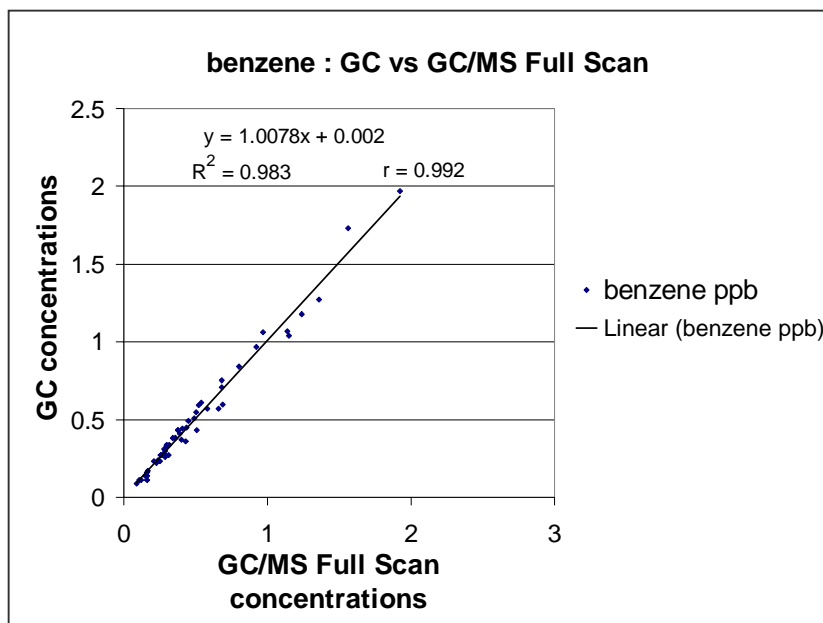
Through the implementation of the base programs, the Branch provides a wide range of operation support and activities extending beyond the limits of the Division.

A. Program Evaluation and Standards Section

Program Evaluation and Standards Section staff performs duties and focuses their efforts in the following areas:

• Program Evaluation

The Section staff advises and coordinates with the Division's field and laboratory staff and client divisions within the ARB to develop, refine, and maintain quality management programs for sampling and analysis activities. The Program Evaluation and Standards Section staff evaluates quality management information to verify if data from sampling and analysis programs meet appropriate quality control requirements for regulatory uses. Ambient air data are evaluated for precision and accuracy, completeness and comparability, and trends purposes (the chart below represents a linear regression analysis of air quality data comparing results obtained from two different analytical techniques). Section staff designs studies to evaluate monitoring programs and sample analysis techniques and also works closely with the NIST for Standard Reference Materials. NIST standards are recognized by the scientific community as having the highest level of accuracy and are used for calibration and audit purposes for monitoring and testing programs in the Division. An example of a study designed by section staff is the PM continuous sampler performance study in Bakersfield where select PM monitors are currently being compared head-to-head in efforts of identifying a suitable continuous monitor to be used for attainment designation purposes.



• Standards Laboratory

The Standards Laboratory performs verifications, certifications, and calibrations of ozone and flow rate standards and compressed gas cylinders that are used to calibrate ambient monitor samplers and analyzers. The Laboratory uses U.S. EPA protocols and procedures using NIST primary standards. The laboratory can certify low concentration ambient standards for air monitoring stations and high concentration source level standards used in source testing. Clients include government agencies and private entities in California and around the world. Laboratory work for agencies other than the ARB and air districts is done on a fee-for-service basis.



Brian Spreadborough and Robert Russell calibrate analyzers using NIST Standards



Brian Spreadborough spans an oxygen analyzer

B. Quality Assurance Section

**Fred Burriel
conducts a field audit**



Audit vans

The Quality Assurance Section provides underlying assurance of the quality of ambient air data collected in California. The Section is directly responsible for the precision and accuracy of all data generated and collected by the Division and indirectly responsible for precision and accuracy of all data of local and private air monitoring agencies in the California air monitoring network. The Section assures that the ambient air data are in compliance with quality assurance criteria of State and federal monitoring regulations and guidance documents.

The Quality Assurance Section staff performs a complex array of field and laboratory performance and system audits for all air monitoring stations in California using a mobile audit van (see photos above). The audit van is equipped with instruments capable of determining the precision and accuracy of instruments involved in all ambient air monitoring programs being conducted in the State. Audits are performed annually and include laboratory performance audits, through-the-probe (TTP) sampler performance audits, whole air sampler

performance checks, TTP continuous analyzer performance audits, particulate matter sampler audits, and meteorology equipment audits, (descriptions follow).

Laboratory performance audits involve the Quality Assurance Section staff sending a regulator and a NIST cylinder containing a mixture of gases to specific laboratories throughout the State for analysis. The audit assesses the accuracy of the methods used by the laboratory in measuring the concentration of pollutants in ambient air.

TTP sampler performance audits are conducted at air monitoring stations for toxic, carbonyl, and NMOC (non-methane organic compounds) pollutants with a gas of known concentration administered to the instrument or collection vessel through an inlet probe. The audit samples are then returned to the respective laboratory for analysis. The audit assesses the integrity of the sampling equipment and transport system, and the accuracy of the analytical methods used by the laboratory to measure the concentrations of pollutants in the ambient air.

A whole air sampler performance check is a means for evaluating data quality and comparing sample results generated by various laboratories throughout the State. Whole air samples are collected using one sampler with separate sampling lines to pull ambient air into several canisters over a specified period of time. After sampling is completed, samples are shipped to participating laboratories for analysis. Results are sent to Quality Assurance Section staff for comparisons, interpretation, and distribution to participating laboratories.

TTP continuous analyzer performance audits are conducted at sites with continuous analyzers capable of monitoring criteria (carbon monoxide, nitrogen dioxide, hydrogen sulfide, sulfur dioxide, and ozone), non-criteria (propane), and TNMOC (total non methane organic compounds) pollutants. The audit involves introducing a diluted mixture of NIST gases and pure air (a mixture at ambient levels) into the sampling probe inlet at varying concentrations. Quality Assurance staff compare results obtained from the continuous analyzer to the known values specified by the NIST. The audit is performed to measure the integrity of the monitoring system.

Particulate matter samplers are audited using either a certified calibrated mass flow meter or a certified critical flow orifice (both standardized against a NIST traceable flow device or calibrator). The samplers are audited for flow rate and difference from assigned specifications. The device audit is connected in-line with the sampler's flow path. The flow rate is measured while the sampler is operating under normal sampling conditions. The indicated flow rate is corrected

based on its calibration, and the true flow is calculated from the audit device's calibration curve. The sampler's corrected flow is then compared to the true flow, and a percent difference is determined.

The Quality Assurance Section audit meteorology parameters that include wind speed, wind direction, ambient temperature, relative humidity, barometric pressure, and total solar radiation.

In addition to conducting audits, the Quality Assurance Section also maintains manuals that contain standard procedures for operating, calibrating, maintaining, and auditing each of the field analyzers in the State ambient network. Quality Assurance information about each air monitoring station that is audited is available via the World Wide Web. Included on the web page are maps, GPS coordinates, station photos, a list of pollutants monitored, and a site survey for each air monitoring station. A site survey is an in-depth overview of ambient air monitoring activities and includes the physical features of an air monitoring station (traffic descriptions, distances to trees, and obstacles) and equipment details (instrument calibration dates and residence times).

C. Operations Planning and Assessment Section

Operations Planning and Assessment Section staff is responsible for planning, coordinating, and assessing new air monitoring projects for the Division. In doing so, staff coordinate with others in the Division to provide clients (Stationary Source Division and Planning and Technical Support Division of the ARB) with field and laboratory air monitoring efforts carried out under initiatives that include the Children's Environmental Health Protection Program, Community Health, asbestos, California Ambient Dioxin Air Monitoring Program, and expanded pesticides programs. Staff assist in preparing clear and detailed data quality objectives for monitoring programs, prepare Request for Proposal (RFPs) for contract laboratory work, and coordinate sampling and analysis efforts with Division staff, communities, air districts, and data user groups within the ARB (Planning and Technical Support Division, Stationary Source Division, and Research Division). From preparing sampling and analysis protocols to participating in monitoring site selection and instrument deployment, staff provide guidance and oversight and serve as leads throughout all stages of a monitoring project. Staff perform data analyses and prepare reports for user groups within the ARB. In collaboration with the public and private sector groups, section staff aim to ensure that operations meet the overall requirements of the monitoring program and the needs of the data users.

3. Branch Capabilities:

Data analysis and program evaluation

- Perform data analysis for ambient air monitoring programs including: Toxics program, Barrio Logan, Multiple Air Toxics Exposure Study (MATES I/II), Children's Environmental Health Protection Program, and Photochemical Ambient Monitoring Stations (PAMS).
- Evaluate method comparison data from PM sampler performance study where select monitoring equipment are compared head-to-head in Bakersfield in efforts of identifying a continuous monitor suitable for attainment designation purposes.
- Perform research in search of diesel particulate measurements based on method tracers and elemental carbon (PM10).

Audits

- Conduct field and laboratory performance audits for ambient air monitoring.
- Conduct system audits of laboratories.
- Perform National Performance Audit Program audits.
- Maintain site survey inventory.
- Submit precision and accuracy data to AIRS.

Air monitoring programs

- Coordinate monitoring program for hexavalent chromium in Hinkley, CA.
- Coordinate monitoring efforts for Children's Environmental Health Protection Monitoring programs in Boyle Heights, Crockett, Fresno, Fruitvale, Wilmington, and Barrio Logan.
- Facilitate California Ambient Dioxin Air Monitoring Program (CADAMP); dioxin and dioxin like PCB monitoring in San Francisco Air Basin and South Coast Air Basin.
- Facilitate application and ambient pesticide studies.
- Review air monitoring methods for Ambient Air Quality Standards.

Quality improvement

- Perform assessment of sampling and analysis methods, monitoring techniques, data analysis and programs, and resolve data quality issues.
- Coordinate laboratory round robin studies for consumer products and automotive exhaust.
- Perform independent review of QC manuals, SOPs, and QC reports.

- Research and provide recommendation for lowering the current limit of detection (LOD) for high-risk compounds where ambient levels approach the laboratory's current LOD.
- Perform technical quality assurance to support special studies.
- Update Quality Assurance Manuals and continue further development.
- Continue Quality Assurance policy development with U.S. EPA.
- Coordinate with clients to define the program and project Data Quality Objectives (DQOs) of ambient air monitoring projects.
- Assist in the preparation of DQOs for monitoring programs.
- Track the progress of monitoring programs to assure that DQOs are being met.
- Assess the monitoring results to determine compliance with DQOs.
- Review and validate field and laboratory data and documentation.
- Submit precision and accuracy assessment data to management for review.

Report writing

- Prepare technical papers for air monitoring projects.
- Maintain and conduct site survey evaluations of ambient air monitoring stations.
- Prepare Quality Assurance Project Plans (QAPPS) to clearly define and describe the critical aspects of non-routine ambient air monitoring projects.
- Prepare monitoring protocols for individual non-routine ambient air monitoring projects.
- Prepare monitoring reports that include data assessment results.

Ambient gas standards

- Conduct calibration, verification, and certification of flow transfer standards.
- Conduct calibration, verification, and certification of ozone transfer and primary standards using a standard reference photometer.
- Maintain current SOPs for the Standards Laboratory that are available on World Wide Web.
 - SOP 5721: Calibration, Certification, and Verification of Low Flow Primary and Transfer Standards.
 - SOP 5722: Certification of Calibration and Audit Gas Standards.
 - SOP 5723: Certification of High Volume Standards.

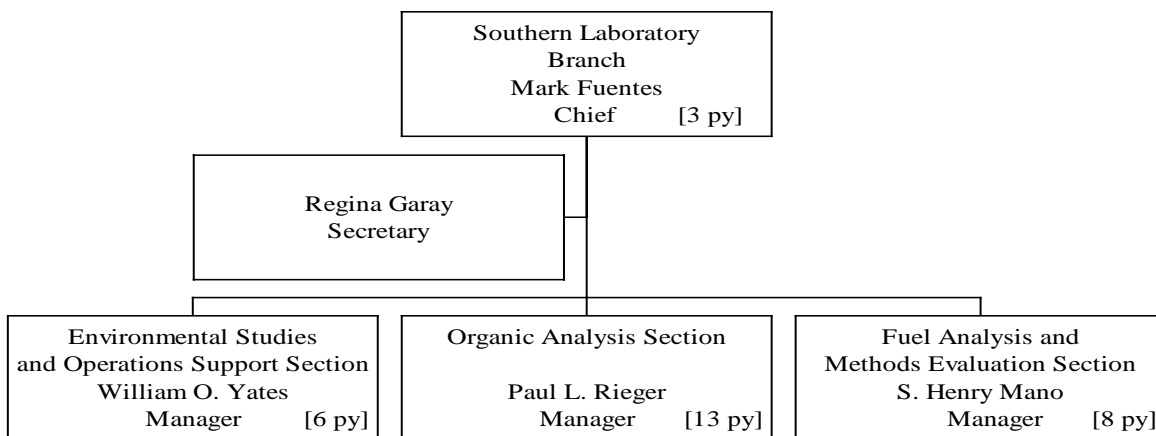
Public outreach

- Provide background information to public through the World Wide Web on audit programs and monitoring activities, the QA Manual, and monitoring site attributes.
- Provide monitoring results in clear formats via the World Wide Web.
- Coordinate with State, Local, government agencies, communities, school districts, and private businesses, to plan monitoring projects.

Mission Statement

To provide accurate and timely measurements for the analysis of mobile source emissions and fuel specifications and provide technical expertise in support of the Air Resources Board's motor vehicle and clean fuels programs.

1. Southern Laboratory Branch (SLB) Organizational Chart



Branch total = 30 py



Group picture of SLB staff (not all staff present)

2. Base Program

The Southern Laboratory Branch has three sections: the Organics Analysis Section, the Fuel Analysis and Methods Evaluation Section, and the Environmental Studies and Operations Support Section. The Organics Analysis Section has the primary responsibility for performing speciated exhaust and evaporative emission analyses for new and used vehicles. The Fuel Analysis and Methods Evaluation Section analyzes fuels, including Cleaner Burning Gasoline and Clean Diesel. The Environmental Studies and Operations Support Section provides varied safety and quality control and data management functions for the Branch.

A. Organic Analysis Section

Low-Emission Vehicle (LEV) /LEVII Program - The Organics Analysis Section identifies and quantifies over 200 compounds of motor vehicles emissions for the purposes of determining smog forming potential (reactivity) and toxicity. Fleets of vehicles equipped with advanced emission control technologies such as ultra-low emission vehicles (ULEVs) are tested. Hybrid electric vehicles (HEVs) and vehicles powered by clean fuels such as compressed natural gas (CNG) and liquefied petroleum gas (LPG) are also tested.



Emissions Sampling

Surveillance Program – Provide exhaust and evaporative emissions analyses for in-use vehicles in order to develop or refine emissions factors for the mobile source emissions inventory.

In-Use Compliance Program – To verify vehicle, manufacturers comply with emissions standards and evaluate the manufacturers' self-certification for new vehicles (Title 13 testing).



Laboratory Analyses

Off-Road Emissions Testing - Perform exhaust analyses and provide technical expertise for testing sources such as personal water craft, marine outboard engines, portable fuel containers, and lawn and garden equipment.

CNG vs. Diesel – Provide analytical support to auto industry and the U.S. EPA for gas phase diesel exhaust.

- American Industry Government Emission Research (AIGER) –In cooperation with the auto industry, AIGER investigates new technology and proposes new and/or improved test methods for measuring vehicular emissions at extremely low levels.

B. Fuel Analysis and Methods Evaluation Section

Compliance Testing of Cleaner Burning Gasoline (CBG) - Develop and evaluate analytical methods for measuring regulated fuel components in CBG. Perform routine testing of CBG to determine compliance with regulations.

Compliance Testing of California Clean Diesel Fuel - Develop methods and enforcement testing of adopted specifications.



Mobile Fuel Laboratory

Fuel Adulteration Testing - Analyze diesel fuel for red dye content to determine compliance with the Internal Revenue Service regulations. Develop fingerprinting methods for fuels in support of tax evasion regulations for the Board of Equalization and the Internal Revenue Service.



Fuel Sampling

Emissions Inventory - Analyze fuels used for surveillance testing for the development of speciated mobile source emission factors.

Marine Engine Testing - Analyze petroleum and combustion products of small marine engines in tanks of water.

C. Environmental Studies and Operations Support Section

Motor Vehicle Programs - Perform data and records management and provide analytical support for the LEV and in-use vehicle programs.

Quality Assurance and Quality Control - Conduct quality assurance and quality control review of analytical data generated by the Organics Analysis Section, and the Fuel Analysis and Methods Evaluation Section.

Safety - Provide oversight of laboratory safety program.

Network Communications – Provide technical support for connectivity and web site development.

3. Branch capabilities

California Non-Methane Organic Gas Test Procedures for Vehicle Emissions

- Analyze exhaust and evaporative emissions for speciated hydrocarbons by Gas Chromatography/Flame Ionization Detector (GC/FID).
- Analyze exhaust and evaporative emissions for carbonyl compounds by High Performance Liquid Chromatography (HPLC).
- Analyze exhaust and evaporative emissions for alcohols by GC/FID.

Specialized Analyses of Vehicle Emissions

- Perform analysis of exhaust and evaporative emissions by Gas Chromatography/Mass Spectroscopy (GC/MS).
- Perform analysis of exhaust and evaporative emissions by Fourier transform infrared spectroscopy (FTIR).
- Perform analysis of exhaust and evaporative emissions for methane and total non-methane organic compounds.
- Develop methods for speciation of diesel exhaust in condensed phase.

Routine Analyses for Vehicle Fuels

- Perform sulfur in gasoline determination by both x-ray fluorescence (XRF) (ASTM D2622) and ultraviolet fluorescence (ASTM D5453).
- Perform lead, phosphorous, and manganese in gasoline determination by XRF.
- Perform oxygenates in gasoline determination by Gas Chromatography /Flame Ionization Detection (GC/FID) (ASTM D4815).
- Perform benzene and total aromatics in gasoline determination by GC/FID (ASTM D5580).
- Perform olefins in gasoline determination by multidimensional GC/FID (ASTM D6293 and D6296) and by supercritical fluid chromatography (SFC) (ASTM D6550).
- Perform detailed hydrocarbon analysis of gasoline by high resolution GC/FID.
- Perform Reid Vapor Pressure of gasoline (CCR Section 2297).
- Determine distillation temperatures of petroleum products (ASTM D86).
- Determine density of petroleum products by digital density meter (ASTM D4052).
- Perform analysis of total aromatics and polycyclic aromatic hydrocarbons (PAH) in diesel fuel by SFC (ASTM D5186).
- Perform analysis of red dye in diesel fuel by ultraviolet/visible spectroscopy.

Specialized Analysis for Vehicle Fuels

- Perform sulfur, nitrogen, and carbon SIMDIS of petroleum products by Gas Chromatography/Atomic Emission spectroscopy (GC/AED).
- Perform individual compound identification in petroleum products using GC/MS.
- Perform confirmatory testing of gasoline using GC/FTIR.
- Perform determination of adulterants in petroleum products using FTIR.

Other Capabilities

- Process data and maintain emissions database.
- Present analysis results in a spreadsheet as part of merged and final reports to provide to clients and management.
- Maintain safety records for OSHA regulation review and compliance.
- Comply with South Coast Air Quality Management rules and regulations on employee commuting.
- Manage local and wide area network.

Appendix A

MLD papers, presentations, and publications

Recent MLD papers, presentations, and publications:**Air Quality Surveillance Branch**

McDougall, Eric M., Stroud, Kenneth R., "Comparison of Real-Time Instruments Used to Monitor Airborne Particulate Matter" Journal Air & Waste Management Association, January 2001.

Bloudoff, Dean P., Cahill, Thomas, Chang, Daniel, Chung, Albert, Jenkins, Peggy L., Kleeman, Michael, Phillips, Thomas J., Stroud, Kenneth R., "Ozone Emissions from a Personal Air Purifier" Journal of Exposure Analysis and Environmental Epidemiology, September 1999.

Ouchida, Peter K., "Evaluation Test Report of a Remote Interactive Instrument Communication System", November 1998.

Grubb, Jennifer S., Ouchida, Peter K., Wu, Teng-Chung, Johnson, Astrid, "An Assessment of the Ladkrabang Industrial Estate in Bangkok, Thailand", November 1998.

McGuire, Terry, Oslund, Bill, "Assessment of Singapore's Ambient Air Quality Monitoring Program", September 1998.

Romans, Jack H., Ouchida, Peter K., Oslund, William E., "Evaluation Test Report of the BGI PQ100 Sampler", January 1998.

Engineering and Certification Branch

Cameron, F., "Lubricity of California Diesel Fuel," SAE Technical Paper 981362, (May 4-6, 1998).

Northern Laboratory Branch

Poore, M. W., "Levoglucon in PM_{2.5} Particulate Matter at the Fresno Supersite", J. Air & Waste Manage. Assoc., accepted for publication June 2001.

Poore, M. W., "Oxalic Acid in PM_{2.5} Particulate Matter in California", J. Air & Waste Manage. Assoc., 50: 1874-1875, November 2000.

Poore, M. W., "Laboratory Data: How Good Is Good?" presented at the National Bar Association Annual Meeting, 1999, San Diego, CA.

Houston, T.E. "Methods for the Determination of Water in Consumer Products," Metal Finishing Journal, 95(10): 36-38 (1997).

Tostado, L., et. al., "Video on Dichotomous PM10 Analysis," presented to U.S. EPA and Districts, (October 1997).

Houston, T. and Poore, M.W. "The Application of the Karl Fischer Oven for the Determination of Water in Consumer Products," Journal of Air and Waste Management Association, 46: 990-992, (1996).

Poore, M.W. and Houston, T.E., "Determination of Exempt and Prohibited Compounds in Consumer Products by Headspace Gas Chromatography/Mass Spectrometry," Journal Air and Waste Management Association, 46: 1093-1095 (1996).

Quality Management Branch

Hammond, Donald, "Essential Standards used in California for the Measurement of Toxics in Ambient Air, Ozone Precursors from Automotive Emissions and Cleaner Burning Gasoline", Pittsburgh Conference in New Orleans, Impact of NIST Chemical Measurement and Standards Programs: Customer Views, March 4-9, 2001.

Tasat, Webster, Albright, Eric, "Interlaboratory Comparison of Ambient Air Samples", Air and Waste Management Association International Symposium on Measurement of Toxic and Related Air Pollutants, Research Triangle Park, North Carolina, September 12-14, 2000.

Miguel, Michael G., "Through-the-Probe Performance Audits of Non-Methane Hydrocarbon Samplers," Air & Waste Management Association International Symposium on Measurement of Toxic and Related Air Pollutants, Research Triangle Park, North Carolina, September 1-3, 1998.

Watson, James Paul. "Automated Gaseous Criteria Pollutant Audits," Air & Waste Management Association 91st Annual Meeting & Exhibition, San Diego, CA, June 14-18, 1998.

Burriell, Fredrick L., "Comprehensive Quality Assurance Site Survey," Air & Waste Management 91st Annual Meeting and Exhibition, San Diego, CA, June 14-18, 1998.

Achtelik, Gerhard H., Omand, Jim, "Effects of Environmental Conditions on Particulate Nitrate Stability during Post Sampling Phase", Presented at the Air & Waste Management Association Specialty Conference on Particulate Matter, Long Beach, California, January 28-30, 1998.

Pomales, Thomas J., "PM10 Mass Analysis System Audit Findings: A Prelude to PM2.5 (Fine) Mass Analysis," Air & Waste Management Association's 90th Annual Meeting & Exhibition, Toronto, Ontario, Canada, June 8-13, 1997.

Warren, Michael V., "Through-the-Probe Performance Audits of Continuous Ambient Air Analyzers," Air & Waste Management Association Symposium on Measurement of Toxic and Related Air Pollutants, Research Triangle Park, North Carolina, April 29-May 1, 1997.

Hammond, Donald, "Ambient Trends of Benzene in California from 1990 through 1995," Presented at The U.S. EPA / Air & Waste Management Association International Symposium on Measurement of Toxic and Related Air Pollutants, Research Triangle Park, North Carolina, May 7-9, 1996.

Westerinen, Alice and Reisman, Barry R., "Study to Determine the Effect of Moisture on Volatile Organic Compound Recovery Rates for Through-The-Probe Audits into Stainless Steel Canisters," Air & Waste Management Association International Symposium on Measurement of Toxic and Related Air Pollutants, Research Triangle Park, North Carolina, May 7-9, 1996.

Southern Laboratory Branch

Cohan, Judson, "Identification of Diesel Fuel Source and Detection of Adulteration by GC/AED," Pittsburgh Conference, New Orleans, Louisiana, March 2001.

Harley, Robert A.; Coulter-Burke, Shannon C.; and Yeung, T. S., "Relating Liquid Fuel and Headspace Vapor Composition for California Reformulated Gasoline Samples Containing Ethanol," Environmental Science & Technology, 2000, 34, 4088-4094.

Zafonte, Leo; Bramston-Cook, Randall; and Scesny, Mark, "Validation of Chromatographic Results for Hydrocarbons in Vehicle Exhaust," Symposium on the Measurement of Toxic and Related Air Pollutants, Durham, North Carolina, September 1998.

Huang, Shiou-Mei, and Rieger, Paul L. "California Clean Fuels Test Methods," ACS Pacific Conference on Chemistry & Spectroscopy, Pasadena, California, 1997.

Appendix B

MLD Web Sites

MLD Web Sites**Air Quality Surveillance Branch**

<http://www.arb.ca.gov/aaqm/aaqm.htm>
Ambient Air Quality Monitoring

<http://www.arb.ca.gov/aaqm/mldaqsb/amn.html>
Air Monitoring Network

Engineering and Certification Branch

<http://www.arb.ca.gov/testmeth/testmeth.htm>
ARB Test Methods Home Page

<http://www.arb.ca.gov/testmeth/vol1/vol1.htm>
Stationary Source Criteria Pollutant Test Methods

<http://www.arb.ca.gov/testmeth/vol2/vol2.htm>
Gasoline Vapor Recovery Systems Certification Procedures and Test Methods

<http://www.arb.ca.gov/testmeth/vol3/vol3.htm>
Test Method for Determining Emissions of Toxic Air Contaminants from Stationary Sources

<http://www.arb.ca.gov/msprog/spillcon/spillcon.htm>
Off-Road Refueling Spillage Control Program

<http://www.arb.ca.gov/vapor/vapor.htm>

<http://www.arb.ca.gov/msprog/offroad/oreft/oreft.htm>

Quality Management Branch

http://arb.ca.gov/aaqm/qmosprog/am_tables/pm25/costanalysis.htm

Excel and QuattroPro spreadsheets developed by ARB staff to estimate the costs of setting up and operating a PM2.5 monitoring network. The user enters specific information related to the size of the monitoring network, the frequency of sampling, and type of analyses desired (e.g., mass, ions, and elements). The spreadsheet returns summaries of field and laboratory equipment and personnel costs.

<http://arb.ca.gov/aaqm/qmosprog/stdslab.html>

Information about calibrations, certifications, and verifications of ozone and flow rate primary and transfer standards, and certifications of compressed gas cylinders.

<http://arb.ca.gov/qmosqual/qmosqual.htm>

Information about the quality assurance activities conducted by the Air Resources Board (ARB). The ARB supports and conducts appropriate quality assurance activities to ensure that data collected are in compliance with procedures and regulations set forth by the U.S. EPA and can be considered good quality data for record. Information about air monitoring accuracy programs, the Quality Assurance Manual, site Information, precision and accuracy results, and monitoring activities in general, is accessible using the above web page and those below.

-Quality Assurance Manual

<http://www.arb.ca.gov/aaqm/qmosqual/qamannual/qamannual.htm>

-Precision and Accuracy Results

http://www.arb.ca.gov/aaqm/qmosqual/PERFAUDIT/CRITERIA/FIELD/ANNUAL_REPORTS/districtreport/AirMonitoringDistrictAccuracy.htm

<http://arb.ca.gov/aaqm/aaqm.htm>

All MLD-quality assurance activities can be found under this URL.

<http://arb.ca.gov/aaqm/qmosopas/chm/cehp/sites/sites.htm>

Information on the six Children's Environmental Health Protection Monitoring Sites

<http://arb.ca.gov/aaqm/qmosopas/chm/cehp/sites/sites.htm>

Monitoring details for Barrio Logan Monitoring Project and access to data query page.

Northern Laboratory Branch

<http://www.arb.ca.gov/testmeth/cptm/cptm.htm>

Consumer Product Test Method

<http://www.arb.ca.gov/aaqm/sop/summary/summary.htm>

Laboratory Operating Procedures for Ambient Air Samples

<http://www.arb.ca.gov/aaqm/elbinor/pm10.htm>

PM₁₀ Laboratory Analysis for Ambient Air Samples

<http://www.arb.ca.gov/aaqm/toxics.htm>

Toxic Air Contaminants Monitoring

<http://www.arb.ca.gov/aaqm/hcarbons.htm>

Hydrocarbon Pollutant Monitoring

<http://www.arb.ca.gov/aaqm/elbinor/icanalysis.htm>

Ion Chromatography Analysis of PM₁₀ Filter

<http://www.arb.ca.gov/aaqm/elbinor/toc.htm>

Total Carbon Analysis of PM₁₀

<http://www.arb.ca.gov/aaqm/elbinor/xrf.htm>

X-ray Fluorescence Spectroscopy

<http://www.arb.ca.gov/aaqm/elbinor/pm10.htm#dichot>

PM₁₀ Dichot Monitoring

<http://www.arb.ca.gov/aaqm/elbinor/drydep.htm>

Dry Deposition Laboratory Analysis

Southern Laboratory Branch

<http://www.arb.ca.gov/fuels/fuels.htm>

ARB Fuels program; Fuel Analysis and Methods Evaluation (FAMES)

<http://www.arb.ca.gov/msprog/levprog/cleandoc/nmogtps.pdf>

California non-methane organic gas (NMOG) test procedures; Organic Analysis Section (OAS)